INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2005/005979

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] C07D519/00, G03G5/06, H01L29/786, 31/04, 51/00, H05B33/14, 33/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] C07D519/00, G03G5/06, H01L29/786, 31/04, 51/00, H05B33/14, 33/22

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
CAOLD(STN), CAplus(STN), REGISTRY(STN)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LUKAS, Aaron S. et al., Biomimetic electron transfer using low energy excited states: A green perylene-based analogue of chlorophyll a, Journal of Physical Chemistry B, 14 February, 2002 (14.02.02), Vol.106, No.6, pages 1299 to 1306; full text, particularly, compounds 5PDI-PI, 5PDI-NI, 5PDI-PDI	1-3
X	GIAIMO, Jovan M. et al., Excited-state symmetry breaking in cofacial and linear dimers of a green perylenediimide chlorophyll analogue leading to ultrafast charge separation, Journal of the American Chemical Society, 24 July, 2002 (24.07.02), Vol.124, No.29, pages 8530 to 8531, full text, particularly, compound lin-5PDI$_2$	1-3

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 June, 2005 (24.06.05)	12 July, 2005 (12.07.05)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	MILLER, Scott E. et al., Ultrafast electron transfer reactions initiated by excited CT states of push-pull perylenes, Chemical Physics, 01 January, 2002 (01.01.02), Vol.275, Nos. 1 to 3, pages 167 to 183, full text, particularly, compounds 5PMI-PI-NI, 6PMI-PI-NI	1-2 3
X	DEBRECZENY, Martin P. et al., Femtosecond Optical Control of Charge Shift within Electron Donor-Acceptor Arrays: An Approach to Molecular Switches, Journal of the American Chemical Society, 28 August, 1996 (28.08.96), Vol.118, No.34, pages 8174 to 8175, full text, particularly, compound 2	1-3
X	LUKAS, Aaron S. et al., Femtosecond Optical Switching of Electron Transport Direction in Branched Donor-Acceptor Arrays, Journal of Physical Chemistry B, 10 February, 2000 (10.02.00), Vol.104, No.5, pages 931 to 940, full text, particularly, compounds 3, 5	1-3
X	HEINEN, Ulrich et al., High Time Resolution Q-Band EPR Study of Sequential Electron Transfer in a Triad Oriented in a Liquid Crystal, Journal of Physical Chemistry A, 14 March, 2002 (14.03.02), Vol.106, No.10, pages 1933 to 1937, full text, particularly, compound ZC-PI-NI	1-3
X	OKAMOTO, Ken et al., Effects of metal ions on photoinduced electron transfer in zinc porphyrin-naphthalenediimide linked systems, Chemistry-A European Journal, 23 January, 2004 (23.01.04), Vol.10, No.2, pages 474 to 483, full text, particularly, compound ZnP-Im-NIm	1-3
X A	MORI, Yukie et al., Spin effects on decay dynamics of charge-separated states generated by photoinduced electron transfer in zinc porphyrin-naphthalenediimide dyads, Journal of Physical Chemistry A, 09 May, 2002 (09.05.02), Vol.106, No.18, pages 4453 to 4467, full text, particularly, compounds 2, 2'	1-2 3
X A	DINE-HART, R.A. et al., Effect of structural variations on the thermooxidative stability of aromatic polyimides, Makromolekulare Chemie, 14 March, 1972 (14.03.72), Vol.153, pages 237 to 254, full text, particularly, Sample Nos. 34 to 36, 46, Polymer	1-2 3

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 10-133403 A (Xerox Corp.), 22 May, 1998 (22.05.98), Full text; particularly, Claim 1; Par. Nos. [0006], [0062]; examples 7, 11 & US 5645965 A & CA 2201418 A & EP 826740 A1 & EP 826740 B1	1-7
X	JP 2001-005204 A (Xerox Corp.), 12 January, 2001 (12.01.01), Full text; particularly, Claim 1; Par. Nos. [0016], [0021] & US 6051351 A	1-4
X	JP 11-124382 A (Ciba Specialty Chemicals Holding Inc.), 11 May, 1999 (11.05.99), Full text; particularly, Claim 15 & EP 896964 A2 & EP 896964 A3 & US 6060601 A	1-7
X	LANGHALS, Heinz et al., Intense dyes through chromophore-chromophore interactions: bi- and trichromophoric perylene-3,4:9,10-bis (dicarboximide)s, Angewandte Chemie, International Edition, 20 April, 1998 (20.04.98), Vol.37, No.7, pages 952 to 955, full text, particularly, compounds 5a to 5f, 6a to 6f	1-3
Y	JP 11-212283 A (Konica Corp.), 06 August, 1999 (06.08.99), Full text; particularly, Par. Nos. [0019], [0020] (Family: none)	1-7
Y	JP 2000-214611 A (Kyocera Mita Corp.), 04 August, 2000 (04.08.00), Full text; particularly, chemical formula (11) to (14), (18), (19) (Family: none)	1-7
Y	JP 2004-093791 A (Canon Inc.), 25 March, 2004 (25.03.04), Full text; particularly, tables 1 to 3 (Family: none)	1-7
Y	JP 2004-093803 A (Canon Inc.), 25 March, 2004 (25.03.04), Full text; particularly, Par. Nos. [0040] to [0051], [0079] to [0084] (Family: none)	1-7

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 05-142812 A (Kao Corp.), 11 June, 1993 (11.06.93), particularly, Par. No. [0007] (Family: none)	1-7
E,A	JP 2005-126367 A (Mitsui Chemicals, Inc.), 19 May, 2005 (19.05.05), (Family: none)	1-7
E,A	JP 2005-154409 A (Mitsui Chemicals, Inc.), 16 June, 2005 (16.06.05), (Family: none)	1-7

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Box No. II **Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III **Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

The technical feature common to the inventions of claims 1-7 is a compound defined in claim 1 which has a partial structure wherein "constitutional units represented by the general formula (1) are bonded to one another without the intermediary of a linking group". Compound having such a partial structure, however, are publicly known. [For example, refer to JP 10-133403 A (Xerox Corp.), 22 May, 1998 (22.05.98) and JP 11-124382 A (Ciba Specialty Chemicals Kabushiki Kaisha), 11 May, 1999 (11.05.99).]

Since there is no technical feature common to the inventions of claims 1-7 which makes a contribution over the prior art, these inventions are not considered so linked as to form a single general inventive concept.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

<Regarding Coverage of Search>

Among the compounds set forth in claims 1-7, only a few compounds are supported within the meaning of PCT Article 6 and disclosed within the meaning of PCT Article 5 to such an extent that a meaningful international search can be carried out.

This international search report therefore mainly covers compounds of the examples which are disclosed and supported by the description.